SUPPLEMENT.

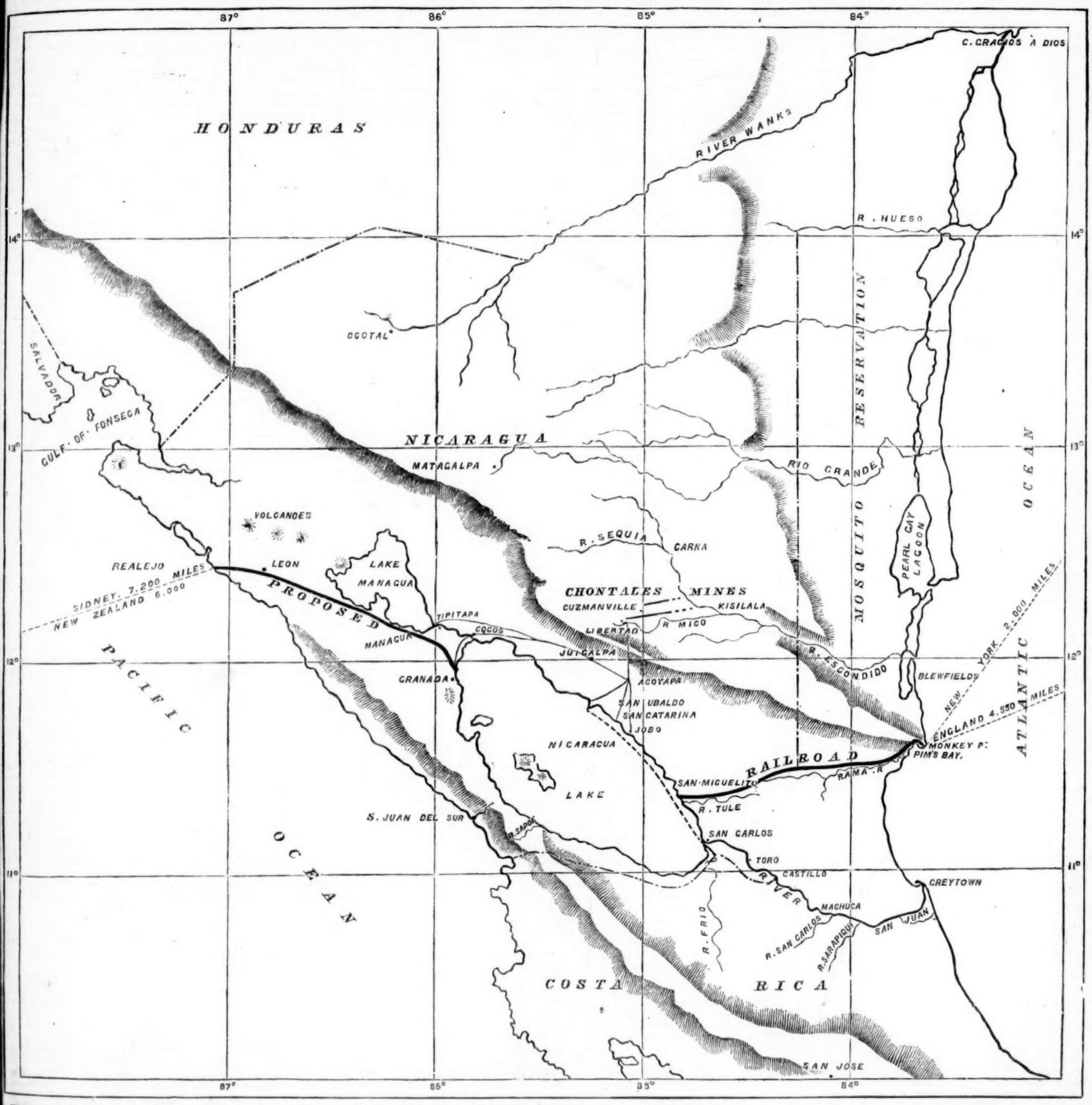
The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1673.—Vol. XXXVII. LONDON, SATURDAY, SEPTEMBER 14, 1867. {STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE.

NEW MINING ENTERPRISE IN THE CHONTALES DISTRICT.



THE CHONTALES MINING DISTRICT—NICARAGUA.

By Commander Bedford Pim, R.N.

[Paper read at Dundee on Sept. 7, 1867, before the British Association for the Advancement of Science.]

Mining is a subject of such great importance, and has played so eminent a part in the civilisation and progress of this country, that I feel, although this paper may not be, strictly speaking, scientific, no apology is necessary for laying before the British Association the following account of a most important new mining locality.

This new district—new as regards foreign enterprise—is situated as nearly as may be in the centre of the department of Chontales, one of the counties, so to speak, into which Nicaragua is subdivided. Nicaragua is one of the five Central American Republics: it lies between the 11th and 15th parallels of north latitude and the 83d and 88th meridians of west longitude: it contains an area of rather more than 30,000 square miles, or (say) 20,000,000 acres, and is about the size of Portugal. The River Wanks, from the sea to near its source, and thence along the mountain ridge to the southern shore of the Gulf of Fonseca, form its northern boundary; while the River San Juan, the southern part of the Lake Nicaragua, as far as the mouth of the River Sapoa, and from the source of that river to the centre of the Bay of Salinas, form its southern boundary. The Atlantic to the eastward, and the Pacific to the westward circumscribe the Republic in those directions. (*Vide* map.)

The physical aspect of Nicaragua is diversified, and for the sake of clearly describing it I shall divide it into three longitudinal sections parallel to its coast lines.

1. The Atlantic side is for the most part low and alluvial, although hills of from 100 to 500 ft. are by no means uncommon. The growth of this alluvium is very rapid and continuous. Blewfields, Pearl Cay, and Cape Gracias Lagoons were once fine harbours; the latter, for example, was the port in which the squadron of Lord Nelson assembled prior to the attack on Nicaragua, in 1780; now there is barely sufficient depth of water to admit the smallest coasters, and the ships which call there for mahogany have to load in the open roadstead. This section is intersected by numerous rivers: some of them, as the Wanks, the Great River, the Escondido, and the Rama, are navigable for a considerable part of their course, and are about equal in breadth to the Thames; but, unfortunately, each river has a bad and shallow bar at its mouth, carrying scarcely more than 7 feet of water upon it. All these rivers are intersected at right angles by large lagoons: indeed, so extensive is this interior water communication that a canoe might be taken from the Escondido almost to Cape Gracias a Dios, with only a few insignificant haulovers to encounter. These lands are of the richest and most fertile nature, and exposed to the full force of the north-east trade wind, fully charged

with saline particles from the ocean. A better field for the production of "sea-island cotton" than this cannot be imagined; especially with such an unrivalled water communication with the ocean, affording a cheap means of shipping the produce.

2. Taking the Pacific side as the second section, we find it cliffy and precipitous; the soil, it is true, of surpassing richness, but for its entire length scarcely possessing a water-course that could be dignified by the name of river. The Sapoa, the Tamarinda, and the Dona Paulina are the largest, but they are little more than rivulets.

The whole of this region is eminently volcanic, none of the precious metals are to be found here; lignites have been discovered bordering on San Juan del Sur. One extremely curious characteristic of this section is the number and extent of the lakes dotted along its surface from the great one called Lake Nicaragua, 90 miles long by 40 miles broad, at an elevation of 128 feet above the level of the ocean, full of sharks and alligators, and with its water always turbid, holding in suspension an immense amount of detritus, but, nevertheless, as good and wholesome as the sweet water of the Nile; down to the diminutive lake of Nijapa, about one-third of a mile in diameter, the water of which presents some marked peculiarities; it is hot to the taste, acrid, nauseous, and smells of sulphuretted hydrogen. The colour on the spot is a light greenish yellow; it is very thick, indeed muddy in appearance, and on being kept some time deposits a black precipitate, which afterwards assumes a reddish brown colour, and consists chiefly of iron; it is strongly alkaline, soapy to the touch, and its cleansing properties are generally recognised by the natives; its alkalinity, as tested by the colour of the flame, is due to the presence of soda; this lake is shallow, and its surface on the same level as Lake Managua—156 ft. above the ocean.

Some of these lakes are fathomless, and as pure as crystal; others highly charged with sulphuretted hydrogen, others with hot springs bubbling up at their edges, others impure; but upon making a hole close to their borders the most delicious water is obtained. One of them is a deep blue, with its waters as salt as those of the sea, although situated more than 150 ft. above the level of the ocean. Here there is a boundless field for the geologist, the zoologist, and the chemist. May it not be long before science is brought to bear upon this highly interesting region.

3.—The last section is the dividing ridge between the two I have just described; it is very hilly, not to say mountainous, but does not, probably, anywhere attain a greater elevation than 5000 ft. It is in this region that gold and silver are found, and in the southern part of which the mines of Chontales are situated. Its configuration is somewhat similar to that of a cornucopia, the curved ending, or apex, commencing in the vicinity of Pim's Bay, thence taking a north-westerly course, and swelling out on either side as it advances towards the northern boundary of the Republic, whence it extends in lofty table lands into the neighbouring States of Honduras, San Salvador, and Guatemala—in fact, assumes once more the grand proportions of the Cordilleras. (*Vide* map). A dense, unbroken primeval forest holds its sway over the greater part of this region, the intervening strip of land between the dividing ridge, and the great lakes of Nicaragua and Managua being all that there is of savana. The forests abound in a profusion of the most valuable woods, cedar and mahogany of gigantic growth, as well as the following list of a collection made by myself in the immediate vicinity of the Chontales Mines, and which I enumerate because of their utility for mining purposes:—

1.—Nispero: first-rate for water-wheels, good for all purposes; square up to 4 feet—plentiful.
2.—Spanish cedar: very useful; squares 3 to 4 feet—supply moderate.
3.—Bastard cedar: squares 3 ft.—good supply.
4.—Guapinol: durable on land or water; very hard, and difficult to cut or saw; squares up to 2 feet—moderate supply.
5.—Caoba: mahogany squares of all sizes up to 6 feet.
6.—Stone wood: very good for all purposes except for fuel; very hard and durable in all weathers—not plentiful; squares 6 inches to 1 foot.
7.—Leopard wood: very beautiful for cabinet work, hard and durable; squares 3 feet. [2 feet.
8.—Canilla: plentiful, easily worked, and durable; squares of all sizes up to
9.—Roble: good, durable, and plentiful—all over Chontales; squares 3 feet.
10.—Ron Ron: beautiful for cabinet work, durable, and plentiful; squares up to 2 feet 6 inches.
11.—Venaca: a light sort of box-wood, very durable and hard, adapted for cogs of wheels—moderate supply; squares up to 2 feet.

For the following general view of the geology of Nicaragua I am indebted to Mr. Ralph Tate, who has made his deductions from various specimens which I obtained *in situ*.—The southern portion, if not the whole, of the Republic of Nicaragua is geologically constituted of two distinct series of rocks; that part situated to the west of Lakes Managua and Nicaragua is volcanic; that lying to the east is made up of schistose and metamorphic rocks, probably of high antiquity, which to the south of a line from Pim's Bay to San Miguelito are overlain by by the above-mentioned volcanic strata. The volcanic rocks, no doubt, are of comparatively recent date, as they are intimately connected with the active volcanoes of this tract. The various rock specimens which Capt. Pim collected along the Rama River, and in the cutting from Pedernal to the source of that river, are trachytes and basalts; whilst the western slopes of the hills, bordering Lake Nicaragua at San Miguelito, are encumbered with a light tufaceous deposit resulting from the disintegration and degradation of the volcanic rocks composing the hills. In the districts occupied by these eruptive materials no metalliferous minerals are at all likely to be met with: possibly lignites, the remains of a vegetation living before the volcanic outburst, may be found associated with the volcanic strata. With regard to the more or less metamorphic rocks to the north of the Rama River or thereabouts, and to the east of the Lake Nicaragua, they are deeply interesting, inasmuch as all the rich mineral veins, including those of gold and silver at Chontales, those of gold at Matagalpa, and those of silver at Ocotal, &c., are contained in these rocks. The relative age of the series is purely conjectural, but the rocks of the chain of hills of the gold district of Chontales are, probably, of pre-Cambrian age, and judging from the rock specimens obtained on the coast near Monkey Point, it would appear that this series occupies the whole country east of Lake Nicaragua. The quartzites of Pim's Bay, however, may be newer than the auriferous rocks of Chontales, and they have clearly been metamorphosed with them. In either case the neighbourhood of Pim's Bay is well worth a diligent search for metalliferous veins, especially when it is borne in mind the great facilities which exist there for the economical transit of ore or bullion to markets.

In describing the climate I shall adopt the same method I have used in speaking of the topography—by dividing the surface into three longitudinal parallel sections:—1, the Atlantic; 2, Pacific; and, 3, Dividing Ridge.

1.—On the Atlantic side the climate is decidedly humid; indeed, the residents jocularly remark that it rains 13 months out of the year. That it is not, however, unhealthy, is evidenced by the fact that few deaths have occurred since my acquaintance with the country. The English Consul and Vice-Consul have been residents at Grey Town for about 15 years. The Moravian missionaries have not lost a man during the same period; whilst out of a considerable number of settlers along the coast, I have not missed one familiar face during the last seven years. The great quantity of rainfall is, no doubt, more or less attributable to the dense and almost impenetrable primeval forest. As a curious instance of the truth of this assumption, I may mention that at the Corn Islands, previous to the emancipation of the slaves in 1848, the entire island was covered with the sea-island cotton plant, with not a tree to be seen. At that time the seasons were very marked—seven months were absolutely dry, while only during the remaining five rain fell. No sooner, however, did the cotton plantations fall into ruin, and a rank vegetation spring up in their place, consequent on the determination of the negroes not to work, than a sensible increase in the rainy season took place; and at this moment, after a lapse of nineteen years, those islands possess a rain-fall nearly equal to that on the adjacent mainland; it may, therefore, be fairly argued that an extensive clearing along the Mosquito coast would very considerably modify the climate. The heat would be extremely oppressive were it not for the strong trade winds; during calms it is excessively sultry. March and April are the hottest months. The mean annual temperature is about 80°, but very few meteorological observations have as yet been taken in this part of the world.

2.—On the Pacific coast, the line of demarcation between the seasons is far more rigidly marked, as from November to May it is dry, or winter, and from the middle of May to November it is wet, or summer. In this section there are extensive plains, called savanas, and the trees are comparatively stunted, the whole country having, doubtless, been cleared and cultivated by the aborigines. The following meteorological observations, taken at the City of Granada, 150 feet above the sea, will serve as a general indication of the nature of the climate throughout this section:—

1864.	Mean.	Highest.	Lowest.	
January	78	83	73	dry.
February	79	84	74	dry.
March	81	86	76	dry.
April	84	88	79	dry.
May	83	88	78	¾ dry, ¼ wet.
June	83	88	78	¼ dry, ¾ wet.
July	83	88	78	wet.
August	82	87	77	wet.
September	80	85	75	wet.
October	79	84	74	wet.
November	76	81	72	¾ wet, ¼ dry.
December	75	80	71	dry.
Total mean....	80·3	85	75·45	

3.—We now come to the Dividing Ridge, the whole of which is one dense primeval forest, containing trees of enormous growth. Here the climate is also humid, although in a much less degree than on the Atlantic coast; the dry season is well marked, but by no means certain in its duration, and it is a remarkable fact that the extensive clearings made by the Chontales Company have materially diminished the rain-fall in the vicinity—for instance, I learn that the rains have not fairly set in this year till the middle of July, instead of as formerly the middle of May. The following observations, taken during the entire year 1864, though rude and imperfect, are at present the best information on the nature of the climate which I have to offer.

Observations made on the quantity of rain-fall during the year 1864 at the San Juan Mine, close to Libertad:—

	Inches		Inches
January	3·715	July	35·465
February	1·005	August	11·715
March	0·725	September	17·210
April	1·965	October	20·245
May	2·460	November	3·475
June	17·185	December	6·125
Total			121·390

For the year the entire quantity of rain was 121·390 inches, the number of rainy days was 226, and the number of dry days was 139. During the seven months considered to form the humid season the quantity of rain was 111·426 inches, and during the other five months only 9·970 inches. The prevailing winds are N.E.—in fact, it is a rare occurrence to experience a change of wind on the dividing ridge.

The following table is a record of the temperature during the year 1864 at Libertad:—

1864.	Mean.	Highest.	Lowest.
January	68·20	78	62
February	73·32	80	63
March	71·16	87	63
April	75·44	88	66
May	74·18	88	68
June	74·84	84	70
July	70·91	84	68
August	71·85	82	69
September	74·25	81	67
October	72·30	83	67
November	74·06	82	64
December	70·63	80	64
Total mean	72·34	82·84	65·61

The people of Nicaragua may be divided into four classes—whites, mixed breeds, Indians, and blacks; or, as characteristically expressed in Yankee doggrel:—

"Some are white, some are blacker,
And some the colour of a chaw of tobacco."

The number of whites is extremely limited, the mixed breeds are numerous, the Indians vastly predominate as far as numbers are concerned, while the blacks, a mixture of Sambos and Caribs, form a very small minority. Based upon the most careful estimates, after travelling north, south, east, and west in Nicaragua, I have been quite unable to reckon up 100,000 inhabitants, and of these at least one-half are Indians; of the remainder not 5 per cent. are blacks, and these chiefly confined to the Mosquito coast—indeed, I have never seen half a dozen black men in the interior of Nicaragua; this would leave rather more than 47,000 for whites and mixed breeds. The people, for the most part, congregate in towns. Leon claims to be the capital in virtue of its cathedral, its population, and its proximity to the principal seaport of the Republic, Realejo, but has a formidable rival in Granada, the inhabitants of which city have more than once attempted to assert their superiority *vi et armis*. The Executive, however, with a wise foresight, determined some years ago to put an end to these rival claims by establishing the seat of government at Managua, a town situated on the shores of the lake of the same name, and about midway between Leon and Granada.

The Nicaraguans are mild and inoffensive; the great bulk live on the Pacific side. Crime of any sort is exceedingly rare, and after travelling from end to end of the country, and crossing it several times, I have never even heard of a case of murder or highway robbery. A case of horse stealing occurred during my third visit, but when I saw the prompt punishment inflicted on the delinquent, I was at no loss to understand how chary his countrymen would be of following his example. His thumbs were put into the barrels of two muskets in such a manner that he could only escape by breaking the bones, while he was thoroughly well thrashed with a supple jack until the stick began to give way. I purchased this most effective instrument for a dime (5d.) I do not mean to say that petty larceny is not rather extensively practised, but, at all events, brigandage is unknown. The limits of this paper will not permit me to give more than the above brief outline of the position and physical geography of Nicaragua, its geological structure so far as at present conjectured, its climate, and its people, but I think I have been able to afford sufficient information to show that the conditions are favourable for the introduction of mining enterprise, and that there is nothing to militate against its successful prosecution, provided the nature and quantity of the ore is good and abundant, and that no insuperable obstacle is offered by the natural features of the country to the transport of machinery and supplies.

About the year 1850 a boy, in digging holes for the uprights of a house near the present town of Libertad, turned up some excellent ore. This stuff, on coming to surface, attracted the attention of a native of some mining experience, who at once saw its value. The news of the discovery in course of time reached Granada, and caused some little excitement; but the filibuster war then raging checked every sort of enterprise in Nicaragua. As soon as affairs became a little more settled a very fine lode, was discovered, close to the banks of the River Mico, a tributary of the Escondido or Blewfields River. This lode, afterwards called the San Juan Mine, was worked upon after the native system, many pozos and bancos being driven upon it with remarkable success. The discovery of two or three smaller mines in the vicinity followed, but it was not until the gem of the district, the famous Javali Mine, was opened out that the real richness of the locality became apparent. Consignments of ore having been made to a well-known firm in London, and my attention having been drawn to the matter while in Nicaragua, and a quantity of specimens of the quartz presented to me, I was enabled on my return to England to lay the subject before some practical men, by whom it was decided to send out a proper person to examine the country, and such gold and silver mines as might have been partially developed. I propose to go a little into detail in describing the exploration, as that will, probably, be the best means of conveying information regarding the mining district now under consideration.

On Nov. 17, 1864, Mr. White, Consul-General for Nicaragua, myself, and Mr. William C. Paul, a mining engineer, who had been selected, after mature consideration, and from among a large number of applicants, as the most fitting to carry out the object in view, sailed from Southampton in the Shannon, one of the vessels of the Royal West India Mail Packet Company, which dispatches steamers on the 2d and 17th of each month. Those of the 2d terminate their voyage at Colon, but those sailing on the 17th proceed as far as Grey Town, which is thus placed in monthly communication with this country. On Dec. 9 we arrived at Colon, having reached that place in the usual time—22 days. On the 12th we were at our destination, also up to time—25 days from Southampton. Perhaps the quickest way of reaching Grey Town is *via* New York; this voyage can be done in 18 days, and seldom exceeds 20 days. Here we found the bar, at the entrance of what was a few years ago a splendid harbour, but is now a shallow lagoon, so bad that it was not considered expedient to land until more moderate weather should have set in, the ship, in the meantime, lying at her anchorage about 2½ miles from the shore, rolling deeply. A glance at the map will show that the mouth of Grey Town River, for harbour, as I said before, there is none, lies in a bight, which is made a dead lee shore for about six months of the year (November to April) by the prevailing north-east trade winds. Even a moderate wind from that quarter is sufficient to send in such a sea as renders it very hazardous to attempt a landing. On the 14th we managed to get through the surf; it is fair to state, however, that my Carib crew had succeeded previously in landing the luggage of the party, but these men are nearly amphibious, and even should their canoe be swamped they manage to bring both it and the freight safely to shore.

At Grey Town we found we should be spared the ascent of the River San Juan in an open canoe, as one of the river steamers of the Central American Transit Company would leave on the 18th, and take us as far as the Lake of Nicaragua more quickly, notwithstanding the four days' delay, than the canoe could do, even if we started immediately. Having some time on hand, I determined to occupy myself in making a survey of the bar, with a view to comparing it with my former one, made in 1860, and accordingly laid down and sounded the entrance, finding scarcely 6 feet of water on it. The harbour of Grey Town is, perhaps, the most singular instance of silting up on record. In 1850 there were as many fathoms of water as I now found feet, and an anchorage capable of sheltering a fleet of vessels. In 1860 there was only 12 ft. on the bar, and scarcely room for a few coasters, while even in one day during the progress of my present survey, a spit of sand had run out more than 80 feet; and I may mention in this place that on my return, in April, 1865, I walked across the bar without wetting my feet, and found that the point had become permanently connected with the mainland. Another outlet for the River San Juan has broken through the sand spit, some distance to the eastward, but the depth of water is constantly fluctuating, and it is as dangerous as the old one; indeed, it would appear that the days of Grey Town, as a harbour, are numbered, although the Central American Transit Company, with characteristic energy, intend to strain every nerve to dredge out once more a permanent opening. At 12 o'clock on December 18 we embarked on board the steamer City of Granada. This vessel was built at Grey Town. She is flat-bottomed, and driven by a huge wheel at her stern, by which a speed of 10 knots can be obtained. She draws 18 inches when deeply loaded, and will carry 500 passengers, besides about 100 tons of freight. Vessels of this class cost the Central American Transit Company about $20,000 each. Wood is used for fuel, at a cost of $5 per cord, and about 10 cords are necessary for the up trip.

The lower part of the San Juan River winds very sharply, and is full of shoals, so that the steamer required four hours to reach the Colorado, which, with the San Juan, forms the apex of the delta—distance from Grey Town about 16 miles. From this point there are fewer obstructions, and we were able to push on during the night; this is not so difficult as might be imagined, because the dark shadows of the trees leave between them in the centre of the river a bright streak of light, along the course of which the steamer is carefully steered. About 4 o'clock on the morning of the 19th we reached the Machuca Rapids, which fortunately had sufficient water to enable us to pass over them in safety. It required 2½ hours to pass the Balas and Mico Rapids, a distance altogether between Machuca and Castillo of about 11 miles of rapids; here we had to disembark, and convey ourselves and luggage to the other side. The Fort of Castillo is the place captured by Nelson in 1780, and it was in storming one of its outworks, situated on an island called Bartolo, that Nelson lost his eye while, as he himself said, *boarding* it. The grandmother of Gen. Martinez was in the fort at the time, and when her husband, who was one of the officers, counselled surrender, the lady, although only 16, made the defenders hold out, and herself fired the cannon which caused the loss of an eye to Nelson. For this act of heroism His Majesty of Spain made the young lady a colonel, besides conferring certain decorations, and a medal of honour, at present in possession of Gen. Martinez, who is now on a special mission to England. The Castillo rapids being too formidable for the steamer to overcome, we had to embark in another steamer, the City of Leon, waiting for us on the other side, but not being engaged on the regular transit trip; she did not leave till half-past 1 o'clock on the 20th. In two hours we had safely passed the Toro Rapids, the last on the river. Up to this time we had been pursued by the rains, which at this season of the year are not expected much above Grey Town. About dark we arrived at San Carlos, a small fort, built on the point where the Lake of Nicaragua runs off into the San Juan River. We had thus occupied upwards of 30 hours in actual steaming on the passage from Grey Town to San Carlos, a distance of 119 miles, or as nearly as possible at the rate of four miles an hour. Here we had to leave the steamer, the course of the Central American transit running to the westward across the lake, while we had to go north about; we had, however, provided ourselves with canoes, which had been brought thus far on the deck of the steamer. It may not be out of place to mention here that the remainder of the transit from San Carlos to San Juan del Sur, on the Pacific, is performed, first, in a roomy lake steamer, well fitted to contend against the strong N.E. trade wind, which here often attains the strength of a gale, and knocks up a very ugly cross sea; and, secondly, on mules or wagons from Virgin Bay to the Pacific, over an elevation of 600 feet in less than 14 miles. The whole of this distance is about 70 miles, 56 miles lake navigation and nearly 14 miles by land, occupying about twelve hours. The quickest transit lately made is thirty-six hours, but sometimes four or even five days are occupied in crossing passengers from ocean to ocean; little or no freight is sent by this route, but for mails and passengers it is generally quicker, and decidedly healthier than that by Panama. When the difficulties of river navigation, &c., are superseded by a well-organised railroad, this Nicaraguan route must, of necessity, become the great highway across Central America. Exactly opposite the Fort of San Carlos, and at scarcely more than 200 yards distant, lies the mouth of the Rio Frio, that mysterious river, about which so many romantic tales are told. Here the Indians are said to be white, with red hair; the most marvellous accounts are given by those who have ventured within the outskirts of their territory of the surpassing mineral richness of the district; and if the specimens of gold, silver, and copper produced can be trusted as authentic, its wealth must be unbounded. Every effort, however, to thoroughly explore this region has met with the most signal discomfiture, owing to the fierce opposition of the Indians.

At 10 A.M. on the morning of the 22st we started in the canoes, deeply laden, for San Miguelito, at which place, being favoured with a nice breeze, we arrived at 4 P.M. San Miguelito is merely a collection of substantial huts (some of them with an upper story), perched upon rising ground, with savana land stretching away inland as far as the eye can reach—a most beautiful scene. This is the Ultima Thule of civilization in Chontales, San Carlos being simply a fort. From this point I decided on journeying overland, through the interior of the country, so that Mr. Paul might have the fullest opportunity of making himself thoroughly acquainted with Chontales; but as time is not considered of importance in Central America, it was not until the 24th that the necessary number of horses could be purchased. In the interval, however, I succeeded in procuring six horses—one, a very fair one, cost $11; a bay pony, $20; two greys, $25 each; and a pair well adapted for carrying pack-saddles, $36 the two. These animals were sturdy little creatures, averaging 14 hands in height, and capable of enduring very considerable fatigue. Mules are much more expensive, but a very good animal may be bought in any part of the country for $50. The price of horses and mules now (1867) has risen about 25 per cent.

At 9 A.M. on the 24th we were able to make a start for our long ride through Chontales. The cavalcade consisted of a guide, with a led horse, or rather I should say one tied to the tail of his own animal, carrying the baggage. Next myself, with a spare horse, tied to my horse's tail in like manner, then Mr. Chambers, and lastly Mr. Paul; it being necessary to maintain single file as the roads are only narrow tracks. The country was low, and in some places swampy, covered

with high grass, and dotted all over with clumps of trees and shrubs, very much resembling an English park, but in certain places next to impassable in the wet season. About one we arrived at the Camastre, a broad estero, over which an enterprising native had thrown a bridge, composed entirely of bamboo, and which, though fragile enough, served its purpose admirably. At 3 o'clock we reached the River Tepinagusapa, emptying itself into the lake. Here we stopped to dine, and afterwards, pushing on, reached a casera about 5 o'clock, where we remained the night; not to rest, however, as a tiger got into the enclosure, and nearly caused a stampede amongst the cattle, whilst smaller animals, scarcely less active, gave us no rest until daylight.

The next morning we started soon after dawn, having breakfasted off a good hot bowl of coffee boiled in milk. At the casera, or milking place of an hacienda, milk is always obtainable in the morning, but the cows are never milked in the evening; cheese can also be procured, but it is generally hard and tasteless. During this day's journey the country was more undulating. Palms were largely interspersed with the other trees, and the orchids appeared to me the most beautiful I had ever seen in any part of the world. Just before 12 o'clock we arrived at Mayasan, where I decided to remain to dinner, it being Christmas Day. The duenna of the hacienda was most kind, and made active exertions to provide a good dinner; fortunately a pig had lately been killed, which, when dished up, afforded the following bill of fare:—Puddings, consisting of a crust of mashed plantains and fresh pork inside; fried shreds of dried pork, with pork sausages and garlic; fried eggs and garlic; minced pork and garlic; ripe plantains, boiled and fried; unripe plantains, boiled and roasted; quajado, or bitter cream cheese; milk in various stages of sourness; pinol, or chocolate, and Indian corn mixed with water; jerked beef in thin strips; tortillas, or cakes of Indian corn, baked on a girdle, and native cheese. This, for the country, magnificent bill of fare, did not, I regret to say, afford the pleasure to my companions which they had expected; they were unanimous in detesting garlic, neither did the bitter cheese and sour milk meet with their approval, while the stringy jerked beef got between their teeth, and was pronounced thoroughly indigestible; so that, altogether, we were not averse to renewing the journey at three o'clock. At sunset we arrived at another hacienda—Las Animas, having passed through the same lovely scenery, and crossed the River Oyate, abounding in alligators, close to the track, although nearly 20 miles from the lake. Here we staid the night; but before going to rest we got up a little tertulia, to the great delight of the peons, who were besides treated by us with English songs, having ringing choruses. The effect must have been very striking, for one of the men was heard to say, "When these English sing it is like an earthquake." When we lay down for the night on the stretched bulls hides, which serve as beds in this country, we found ourselves as much tormented as on the previous evening, and heartily wished we had stopped at Mayasan, which is by far the cleanest hacienda in the country. The following morning saw us early in the saddles: the country we passed through was more hilly than hitherto, and as Mr. Paul observed, seemed to indicate mineral riches in no ordinary degree—in fact, reminding him forcibly of California, in which idea I entirely coincided. A little before dark we arrived at Acoyapa, the capital of the department, with a plaza, and a church and some 2000 inhabitants. During the whole of the journey we constantly passed numbers of cattle, quietly grazing close to the track, and not the least wild. Acoyapa lies about half-way between the mines and the lake, and is well situated as a resting place midway; there are three tracks leading from it to the mines. One through Lovogo and Libertad, another directly across the country, and the third by way of Esquipula. We adopted the first, simply to examine the country, for it is by far the most roundabout route. At a little past 11 o'clock on the 27th we mounted, and soon after passing Lovogo began to ascend the ridge dividing the water-shed of the lakes from that of the Atlantic; on the summit of one of the hills we had a magnificent view, Omotepec away to the S.S.W., at least 80 miles distant, Mombacho quite distinct, while inland the peak of Piedra Blanca, about 15 miles, pointed out the position of the mines, from which it is not more than two miles distant. The surrounding country is very bare of trees, and in many dry river beds and barren-looking hills reminded Mr. Paul and myself again most forcibly of California. After crossing this dividing ridge, we descended on savana lands, similar to those we had ridden over on the other side of Acoyapa. It was 7 o'clock before we arrived at Libertad, and quite dark, and we had thus occupied about eight hours on the journey, but then our animals had scarcely ever gone faster than a walk. I estimate the distance as 20 miles between Libertad and Acoyapa.

Libertad is a small, though thriving, mining town; it is built on the Mico, a branch of the Blewfields River, and is as yet in its infancy. The number of foreigners in its vicinity amounts only to 35—15 French, 10 Germans, 8 Americans, and 2 English, and the total population in and around the town does not probably exceed 2000.

From Libertad we made various excursions then and subsequently, from which I gleaned the following information:—Roughly speaking, the left bank of the Mico, for at least eight miles on its course from Libertad, may be taken as defining the edge of the primeval forest in the midst of which the mines are situated. Crossing the Mico at a ford about five miles below Libertad, the forest is entered by a narrow track or path, made by clearing away the trees and undergrowth, the stumps in many cases sticking out some feet above the ground. It would be quite impossible to give an adequate description of the vileness of this road when we first rode over it, not alone because the unfortunate animals sunk up to their bellies in the mud at every step, but because in selecting the path an utter contempt seems to have been felt for level ground; everywhere the road led straight on, and over the highest and steepest hills. When I last passed over it, in April of this year, the journey could be performed without danger to life or limb, the road having been widened to at least 40 ft., allowing the sun's rays to have some influence in drying the ground. This widening only served to point out more clearly the hideous deformity of the section, and in this respect the track, only eight miles from the Mico to the mines, is as difficult as all the rest of the route to San Ubaldo put together. On the first occasion it took us a whole day to ride to the mines from Libertad, but now that time is reduced two-thirds. From Libertad there is another route to the mines; you can cross the Mico at once, and proceed through a narrow track in the forest straight on, passing various workings on the way, such as Tigre, Calvario, Virginia, San Miguel to the right, &c. This road is, in some respects, better than the one I have described, since its route is not so directly across country as the other, and more attention has been paid to the grades, but being very narrow it is, and will continue to be, nothing but a series of mud holes until the sun's rays are admitted. The great want in Nicaragua is roads, but looking to the very heavy nature of the rains in the wet season, and for other substantial reasons, I am convinced that it would be far cheaper to make tramroads at once. These can be constructed of very durable wood, the nispero for rails, and the canilla, stone, or leopard wood, for sleepers, at a cost of $3 per running yard, or (say) $5000 per English statute mile, and laid down at the rate of three miles per week.

The San Juan Mine is the oldest in Chontales, having been discovered seventeen years since; it is close to Libertad, on the opposite bank of the Mico, and the machinery upon it is worked by the water from that river. The system of mining is that common throughout Spanish America, and consists of sinking a pozo about 25 feet, and then driving a banco or adit at right angles to the pozo for the same length, and so on until water is reached, when the works come to a standstill, although the lode is invariably found richer as depth is increased. The labour of bringing up the ore, however, is immense, and increases in proportion to the depth, the miners having to carry 100 lbs. weight of the ore to surface by climbing a notched pole, with the tenaja supported on their backs by a leather strap across the forehead. For this labour they are paid $9·60 per month, and their board, amounting to another $8; total, $17·60, say 3*l.* 15s.

Several other mines were being worked during our first visit, some of which have passed into the hands of the Chontales Company; they are beyond question rich in gold and silver, possessing broad veins, which it will require many years, with the most powerful and approved machinery, to exhaust. The difficulty of transport and want of water-power are at present the most formidable obstacles to success, but there seems every hope that with time and patience these will be overcome. It is not too much to say that the whole of this district is covered with veins of gold and silver, of greater or less value, according to their breadth and the facility with which they could be worked and drained. The auriferous and argentiferous district of Chontales commences near the town of Libertad, in the mountain range, which runs nearly parallel to Lake Nicaragua; it is many miles in width, and continues from this point towards the east to an unknown distance. To give an idea of how little is known of these unexplored wilds, I may mention that when a picquet was cut, defining the boundaries of only 10 caballerias of land, surrounding the Javali Mine, the property of the Central American Association, some splendid ground was discovered, and a plantel, or water-power, surpassing that of the Javali itself. The gold-bearing lodes in the Chontales district, as at present known, have not been lain bare beyond a breadth of 1½ mile; the yield on an average is 1 oz. of gold to the ton. I believe the lodes to be only two in number, parallel to each other, and striking E.N.E. and W.S.W., but information on these points will shortly be given us, as the gentlemen about to sail for Nicaragua will have orders to map out the district at once. Near the surface the quartz is friable, but it produces more visible gold with increased depth. These lodes thus present exceptions to the general mode of occurrence of gold in veins, for this precious metal, whatever may have been the agency by which the impregnation of the veinstones was effected, has been chiefly gathered together at the surface of the rocks, and the veins, though rich at the surface, are soon lost.

The introduction of steam machinery of an improved sort has commenced; on our first visit there was a rude engine at work, but now the steam-whistle can be heard beyond the English property. An American, named George King, having a mine close to those of the Chontales Company sold it to advantage; and having denounced another, a little further in the forest, but without water power, he went to New York with the proceeds of his former property, bought the necessary steam machinery, and lost no time in erecting it. In less than six months he was again in Nicaragua, cut a new road from Libertad, and brought in his machinery, which was in full operation when I left in April last.

After the mines of the Chontales Company comes Javali. The romantic history of the discovery of this mine Dr. Seemann has told in the *Athenæum* in his peculiarly interesting manner; its ores are not much richer or more abundant than those of the former, but it possesses a fine water power, or plantel, by which its produce can be economically reduced. The mine proper consists solely of a narrow strip of land, 200 varas wide, by 1000 varas long, running nearly due east and west, and its water-power, or "plantel," is afforded by the Javali River—quite a stream, even in the dry weather, and which, within a few yards of the vein, takes a leap of about 150 feet. This narrow strip of land is traversed throughout its entire length by a ridge, varying in height above the general level of the ground at its base. At its eastern limit, which is the point where the vein is crossed by the Javali River, the elevation is very low, but it increases towards the westward, so that at this end its height is more than 200 ft. Through the central line of this ridge runs the lode; in fact, the ridge is the lode itself, with a slight covering of earth and vegetable matter, which the agents of time have accumulated more abundantly at the base than at the summit. This undulation, or rise, affords great convenience for driving levels on the lode far below any of the present old workings, and thereby giving great advantages for bringing the ore to the mills at any level desired. The workings are comparatively superficial, save, perhaps, the Socorro, the bottom of which is 150 feet from the surface, consisting of 10 pozos and bancos. The advantages thus afforded for the cheap and complete drainage and ventilation of the mine are, as will readily be seen, very great. Such an elevation of the lode secures, in the most perfect manner, the complete drainage of all the works which can be carried on in this mine for very many years to come. The ledge slopes from a point near its western limit 462 feet above the water level, to the bed of the Javali River, at its eastern boundary. The lowest tunnel driven from this latter level would, of course, drain all the works above it, and keep them perfectly dry. A few hundred yards lower down the river there is another fall, of 160 ft., so that by driving a cross-cut from the foot of this fall into the Javali lode, which continues on the other side of the river in the same direction, the drainage of this second section would, undoubtedly, be secured, and that continuation, or Cabazeles, as it is called, could also be worked, at how great a profit will be apparent when it is mentioned that the lode is quite as broad and rich on this side of the river as on the opposite bank. Those who have had to contend against the difficulties and great expenditure caused by a flooded mine can thoroughly estimate the value and importance of so favourable a location; indeed, it is not too much to say that here is the proper spot to commence operations on a large scale. The water-power at the Cabazeles is very fine, and with such a powerful means of economically reducing the ores, as a beginning, large returns could have been long since obtained. As it is, the Javali River is, and must continue, the only real basis of mining operations in this district until further explorations disclose other "plantels" or water-power of a like force. The quality of the ore, in respect to the ease with which it may be ground, is very good; in some parts of the vein it is more or less hard, but the majority of it is quite soft and friable; the hardest of it could without difficulty be reduced by proper stamps and modern machinery, even without calcination.

The ley or percentage of gold in the ore seems to increase with the descent from the surface. The supply may be said to be inexhaustible. The width of the vein varies from 2 to as many as 20 yards; taking the average width as only 3, there would then be contained in this first section of the lode before spoken of as the one situated above the water line of the Javali River, not less than 231,957 cubic yards of ore, or about 475,512 tons. In the second section there is contained, assuming the same average width of the vein, 160,000 cubic yards, or 328,000 tons, all of which will probably yield at least a general average of 1 ounce per ton, and perhaps more, for the quality of the ore improves the deeper the mine is driven. But when large quantities of auriferous quartz can be obtained in a country where the price of labour is not high, as in Nicaragua, it is not necessary that it should contain a large amount of the precious metal in order to render its treatment, by the aid of well-constructed machinery, remunerative. As an instance of the very small yield which, under peculiar circumstances, may be rendered available, I would adduce the fact that, at Schemnitz, in Hungary, by the aid of well-constructed stamps, the mining managers extract with advantage one-eighth of an ounce per ton; and that the St. John del Rey, in the Brazils, yields a noble profit with five-eights of an ounce per ton. Again, the average yield of gold from the quartz reefs in the colony of Victoria, for the year 1866, was 10 dwts. 16½ grs., a little more than half-an-ounce to the ton of quartz, at a cost of raising, crushing, and management of about 13s. per ton; the actual profit would, therefore, be about 17s. on every ton of quartz crushed. The very tailings of the Javali, which have now accumulated for many years, are equal in richness to the quartz reefs of Australia, the yield being 11 ozs. of silver, and ½ oz. of gold to the ton.

The Chontales Mines, from which the Javali is about ½ mile distant, are about midway between the Lake of Nicaragua and the tide waters of the Caribbean Sea. San Ubaldo is at present the most available port on the lake shore, although there are two others, Santa Catarina and Jobo, which might be turned to good account. The Indian village of Kisalala, at the head of the navigable waters of the Blewfields River, is the nearest point of embarkation direct for the Atlantic. (*Vide* map.)

The absence of a certain, speedy, and secure means of communication with the outer world is almost the only serious difficulty which mining enterprise has to contend against in the development of the unbounded mineral resources of Nicaragua; it, therefore, becomes of great importance to consider the best means of opening a communication which shall answer the requirements of the case. Taking the route by the Lake of Nicaragua, in the first place, there are three different modes of communicating with Europe. First, through Juigalpa, across Tipitapa to Leon and Realejo, now called Corinto, where an American steamer calls twice a month to convey passengers and the mails to Panama, and thence in the regular fortnightly mail to England. This journey is performed entirely on mule back, and five days in the dry season is required, but when the rains have set in more than double that time is necessary. The cost of a monthly journey by this route is at present $150 the trip; and when the charges of the Pacific steamer and the transit across the Isthmus of Panama are taken into consideration, it will at once be seen how expensive this is, even for mails and for specie, and that it would be practically out of the question for machinery and heavy goods.

The next route would be the same as far as the Tipitapa River, whence the road would turn off by Cocas to Granada instead of Leon. From this place a Government canoe starts once a month to Grey Town, and letters and specie can be forwarded by this way. The journey is performed on mules, and requires three days in the dry season, and very often more than a week in the wet. Of course, no machinery would ever be sent by this route, because the lake port of San Ubaldo is so much nearer. The cost of a monthly trip by this route need not exceed $100; add the mail charge of the Nicaraguan Government, and it will be seen that this route is cheaper and shorter than the last named. The third, and that now in use, is from the mines to San Ubaldo (*vide* map). This may be ridden over in one day in the dry season, on a very good mule; the distance is about 45 miles. The usual time is two days, and in the wet season about four. Leaving the mines at daybreak, a conducta of good mules may reach the Mico in three hours—say 9 A.M. Travel over the savana, and cross the dividing ridge in five hours more—say by 2 P.M.—and from there, after stopping near the summit for some refreshment, easily reach Acoyapa before sunset. From Acoyapa to San Ubaldo the distance is about 15 miles, but the latter half of the road is over an extensive jicoral of thick black mud, hard enough in the dry season, but a very slough of despond in the wet. The route from the edge of this morass to San Ubaldo passes over very rugged hills; this road, although the shortest between the town and the lake, is not so good as the somewhat longer route to either Sta. Catarina or Jobo. I found I could ride over one in as short a time as the other—viz., before noon of the second day.

At San Ubaldo the Chontales Company have a canoe, and their mails are regularly forwarded in this manner once a month, the canoe going straight to Grey Town and back, the round trip from the mines and back not taking up less than three weeks. This route, properly organised, might be much improved, but at present it is quite as long and expensive as that by way of Corinto; indeed, as at present managed the cost to the Chontales Company cannot be less than 800*l.* a year. It most unfortunately happens in connection with this route that when the land portion is dry and easily traversed, the river part is also dry, and greatly delays the canoe; during the wet season, when the river is high, the current retards the progress of the canoe almost as much; while the land journey at that time of the year is necessarily protracted. In short, each of these means of communication by way of the lake is most circuitous, and the delays and expense are so considerable, that I was obliged to turn my attention elsewhere, although I am very far from asserting that the San Ubaldo and Grey Town route may not be so materially improved by system and organisation as to render it a very useful one.

If the difficulties of all the routes, *via* the lake just related, are experienced by a strong man riding light, those to be overcome in the transportation of machinery or supplies must necessarily be very much greater. I was, therefore, induced to look towards the Atlantic, in a direct line, *via* Kisalala, for a practical route. I had often discussed the subject with my friend, Dr. Seemann, and, with the view of eliciting further opinions and collecting additional information on the subject, the latter was induced to convoke, on Jan. 6 last, a meeting of all such persons then in Chontales who were in any way practically acquainted with the district between the mines and the Atlantic seaboard. The meeting having pronounced unanimously in favour of the practicability of our plan, and having myself ascended to the summit of Piedra Blanca, from whence I obtained an extensive view of the surrounding country, and satisfied myself of the feasibility of the project, I had no hesitation in ordering a road to be cut from the mines to the Blewfields River, by which, on a reference to the map, it will be seen a direct route might be opened, provided no serious difficulties interposed. A native, named Trespalacios, a thoroughly practical man, well versed in wood-craft and forest-life, undertook the work, with a gang of Indians. He reports that the distance between the Javali Mine and the village of Kisalala by his trail, which pursues an undeviating course, is not more than 16 leagues, and the time necessary to pass it on foot, and over the rough pathway that he opened, less than two days. The trail lies over a level plain and gently descending slopes; there are no natural obstructions, such as precipitous hills, deep ravines, or rapid rocky rivers, in the course, and that were it not for the trunks of dead trees which lie across the path, and that it crossed one or two streams at points where the nature of the banks would not allow a mule to descend, one might ride the entire distance with ease at the present time. Once arrived at Kisalala there will be no difficulty in getting either to Blewfields or Grey Town in a very short time.

I made the trip from Blewfields to Kisalala and back in May last; the river is wide, deep, and free from rocks and shoals. The trip down can be made in less than eighteen hours even in the dryest season. At the largest calculation the round trip from here to the town of Blewfields and back over this route would not exceed in duration a week, against three by the present way. As for supplies, they might be shipped direct from England to Kisalala, and be landed there without breaking bulk; or, if the vessels which brought them across the Atlantic could not ascend to Kisalala, the cargo could be lightered up the river speedily and cheaply. A schooner sails monthly between Blewfields and Grey Town, a distance of 60 miles, and would afford every facility in the way of carrying letters, bullion, or messengers. Formerly, the steamers of the Royal West Indian Mail Steamship Company touched at Blewfields every month, and it is probable that they would gladly do so again if any inducements were offered them in the way of passengers, mails, or freights.

When I arrived at the mines in February this year I found that Dr. Seemann had originated the idea of forming a settlement in the vicinity of the Chontales and Javali properties; in this plan I cordially concurred, and in April I succeeded in obtaining a decree or authorisation from the Government of Nicaragua for founding a town, which I had much pleasure in naming Guzmanville, after His Excellency the President. A town which shall take the place of Libertad is greatly needed close to the mines; in the first place, it is very desirable that respectable miners should be encouraged to settle and make their homes in the vicinity; their services may thus be secured as they are needed; in the next place, there is a necessity for a reliable source whence to draw supplies close to the mines, at a cost far less than is now paid for the necessaries of life at Libertad. Of provisions there is abundance in that town; and during the greater part of the year the supplies are brought to the mines for sale in any quantity, but towards the close of the rainy season the roads become so heavy that a scarcity often occurs, which will now be obviated by the close vicinity (less than half a mile) of the town of Guzmanville.

In conclusion, I may remark that our present knowledge of Nicaragua is still very imperfect, owing to the difficulties in the way of any one man single-handed carrying on his explorations in such a comparatively new country. I have the satisfaction, however, of believing that I have succeeded in drawing attention to this most beautiful and productive State, and I hope that year by year I may be able to add something to our knowledge. This hope is rendered more feasible by the fact that I have just had the pleasure of appointing some highly intelligent and scientific gentlemen to responsible positions in Nicaragua, the results of whose labours I trust will be a benefit to science as well as to commerce.

AMERICAN STEEL.—It appears that the Americans are making such rapid progress in the manufacture of steel, that confidence is expressed that at no distant period they will be enabled to dispense entirely with all foreign supplies. A correspondent (W. H. D.) of the *Mining and Scientific Press* remarks that it has heretofore been said, and many have made the assertion from their own experience, that a first-class article of steel, to answer all the most difficult purposes to which steel is applied, could not be made in the United States. This, however, has been proved by experience and observation to be incorrect, in evidence of which reference is made to the Philadelphia Steel Works (Messrs. Baldwin, Banes, and Co.), which has become celebrated for the manufacture of the "Nonpareil steel." The works comprise an area of four acres, and are pleasantly situated on the banks of the Frankford creek, about five miles from the centre of business in Philadelphia. The situation was selected with great care, by one of the firm, and experience has proved the correctness of his judgment. The creek is navigable all the way up, and it is no unusual sight to see boats delivering coal and iron, while others are taking in steel, to be shipped to distant parts of the country. The iron is imported, expressly for the firm, from Sweden and Norway, in bars 1 in. wide and ½ in. thick. It then goes through a process by which it is freed from such chemical elements as do not enter beneficially into the mann-

facture of steel, and which process is known only to the proprietors. The bars are then cut into pieces about two inches long, and are placed in a blacklead crucible, holding 50 lbs., along with a small proportion of finely-ground charcoal and some black oxide of manganese. The crucibles are then placed in a large furnace, known as the "melting furnace," and exposed to an intense heat for three or four hours, or until the "melter" decides that the mass has become thoroughly incorporated. They are then withdrawn by a man known as the "puller out," and passed by him to the "melter," who pours the metal into the iron moulds, where it is allowed to cool, after which these pieces are known as ingots. From here it is taken to a steam-hammer, weighing about 1800 lbs., and "broke down"—that is, it is reduced to nearly the size that the bars are intended to be when finished. After this, it is taken to the finishing hammer, where it is finished to the proper size, unless the size be very small, when it has to go to still another hammer, much lighter. The ends of the bars are then cut off, to make a double and triple-refined cast steel; and, after being labelled, the steel is ready for market. This is the steel that has given such satisfaction where it has been introduced, and which has, to a great extent, displaced the English steel in the Eastern and Middle States. The "Nonpareil steel," however, is considered to be as much superior to this as this ordinary steel is to wrought-iron. The peculiarity of the manufacture by which they obtain this superiority consists in a novel process which the steel goes through during the refining, and which expels all the impurities in a much better manner than it has heretofore been been possible to do, and which has been introduced by the firm, and is known only to them; and so reliable is their process, that they can depend on having a uniformity in the texture of their large and small bars that is not obtained by any other steel works, either in this or any other country. The experiments by which this knowledge was obtained were conducted before they introduced any of their steel into the market, the proprietors being determined not to sell an article that they were not certain could be depended on, and they regulated their standard by the best English steel.

FOREIGN MINING AND METALLURGY.

The Minister of Public Works has determined not to accept the results of an "adjudication" for coal required for the Belgian State lines, but to have recourse to direct tenders. The general impression which this determination has produced is one of astonishment that so considerable an administration should pursue a line of conduct based apparently on fortuitous and not on uniform rules. Eighteen months since a coalition of builders was said to have invalidated an adjudication for locomotives and carriages, and caused orders to be passed to foreigners, in order to secure an "economy," the importance of which was vigorously disputed. Three weeks since, the Government, with the laudable object of coming to the aid of suffering Belgian industry, let twelve locomotives, without having recourse to a public adjudication, and the intention was attributed to it of accelerating orders for plant, in order to benefit native industry. Finally, a week since, the same administration declined to accept the prices furnished in public adjudication by Belgian coalowners, and invited Belgians and foreigners to address themselves directly to the administration. It is beginning to be asked whether the Department of Public Works considers that there is now a coalition of coalowners, as there was formerly a coalition of engine-builders. And, further, it is asked whether, if by some impossible combination, a German, French, or English coalowner offers to accept the delivery of combustible at a lower rate than Belgians, the Government will treat with the enterprising individual. An advance of 10d. per ton has been attempted in the Liége basin; at present, however, the other Belgian basins have not followed this upward movement. Freights remain without change, the deliveries made not being very numerous. The state of Belgian metallurgical industry has not varied materially, and there does not appear at present to be any immediate prospect of improvement. It is expected, however, that the administration of the Belgian State Railways will shortly give out some orders. The Providence Forges Company will pay, Oct. 31, a dividend for the exercise 1866-7, or 2*l*. per share. The Falnuée Collieries Company, at Courcelles, is now paying a dividend for the first half of 1867. The Augsburg Company for the Manufacture of Machines will pay, Oct. 1, a dividend of 5*l*. per share for the exercise 1866-7. Meetings are announced as folows: Company for Working the Mineral Concession known as Bicquet-Gorée and Heure-le-Romain, at Amsterdam; Pieton-Campagne Colliery Company, Sept. 17, at Charleroi; Luxembourg Mines and Sarrebruck Forges Company, Sept. 17, at Dusseldorf: Charleroi Iron Manufacturing Company (Victor Gilleaux and Co.), Sept. 28, at Charleroi; Vezin-Aulnoye Company, Sept. 30, at Huy; Mining Company of the Rhine, Oct. 9, at Cologne; and Sars-Longchamps and Bouvy Collieries Company, Oct. 31, at St. Vaast.

The information which comes to hand from the various centres of French industry is of a rather contradictory character. At the same time, the reports made from some quarters are of a somewhat more favourable nature. A forgemaster of the Meuse district is stated to be employing with success the pig for re-casting of M. d'Adelsward, of Longwy, and it is added that he even prefers it to the English "J. W. L." mark, which is delivered at Bar-le-Duc at 4*l*. 7s. 3d. per ton. This pig of M. d'Adelsward is derived from a furnace which has been lighted about six weeks. The production of pig and iron in France in the first six months of this year is calculated as follows, as compared with the corresponding period of 1866:—

	Iron.		Pig.	
Group.	1867.	1866.	1867.	1866.
Aveyron ..... Tons	14,586 ..	18,659 ..	17,931 ..	25,569
Ardennes and south of the Moselle	52,885 ..	57,591 ..	33,985 ..	38,016
Paris basin	14,100 ..	13,000 ..	21,868 ..	22,718
Centre	66,470 ..	72,036 ..	49,799 ..	54,230
Champagne	52,203 ..	68,215 ..	33,600 ..	39,496
Comté	32,489 ..	35,830 ..	25,804 ..	26,260
Corsica	5,899 ..	9,946 ..	313 ..	420
Creusot	58,108 ..	57,666 ..	50,005 ..	50,086
Escaut	34,382 ..	34,905 ..	28,734 ..	33,045
Gard and Bouches-du-Rhône	20,501 ..	19,004 ..	8,864 ..	10,524
Loire	92,147 ..	95,658 ..	60,010 ..	65,412
North of the Moselle	98,674 ..	81,947 ..	49,114 ..	42,465
North-west	11,144 ..	12,119 ..	6,618 ..	7,988
Sambre	36,088 ..	40,203 ..	37,369 ..	32,827
South-west	14,418 ..	17,182 ..	5,842 ..	5,260
Total	605,082 ..	633,958 ..	429,854 ..	454,406

It will be observed that the production of iron declined in France during the first half of this year to the extent of about 4 per cent. The only districts which presented an advance this year were the Paris basin, Creusot, the Gard and the Bouches-du-Rhône, and the north of the Moselle. The decline in the production of pig in France in the first six months of this year was somewhat more than 5 per cent.; the only districts in which the production increased this year were the North of the Moselle, the Sambre, and the South-West. Business in minerals is proceeding a little better in the Meurthe than in the environs of Longwy. There are said to be only two great blast-furnaces now working refining pig in the Meurthe—one at Pont-à-Mousson and the other at Liverdun. The Pont-à-Mousson furnace, it is further stated, has no stock, while some important supplies have accumulated at Liverdun. The coke-worked furnaces of the Meuse have considerable stocks of pig for refining on hand. The furnaces which devote themselves exclusively to the production of casting pig are, however, a little better off; the Bar-le-Duc works are said to have orders on hand for the next ten months and more, thanks to the excellent quality of their products. The Loire Mines Company will pay, Oct. 16, a dividend for the first half of 1867, or 5s. per share. Meetings are announced as follows:—J. F. Cail and Co., Sept. 26, at Paris; Stiring Collieries Company, Sept. 28, at Paris; Sougland and Fourmies Forges and Foundries Company, Sept. 28, at Paris; and Andennes Metallurgical Company, Oct. 1, at Andenelle.

Affairs in copper have been animated on the Havre market, and prices have been progressively rising in consequence; Chilian in bars is now held at 75*l*. per ton for disposable, and 75*l*. 8s. for lots to be delivered. A small lot of refined Chilian has found a purchaser, at Havre, at 80*l*. per ton; the sale is also mentioned on the Havre market of about 3 tons of old copper arrived from Nassau, while 3½ tons of Lake Superior, Minnesota mark, have found purchasers at 98*l*. per ton. At Paris the article has displayed a good tendency, and prices have been pretty well sustained. English in plates has made 80*l*.; Lake Superior, 92*l*.; Chilian, 76*l*.; and Corocoro mineral, 80*l*. per ton. The German markets seem disposed to participate in the upward movement, but to a less extent, as hitherto the advance has not made any very sensible progress. At Hamburg copper has been more sought after at previous rates, but purchasers do not show themselves disposed to submit to the higher terms for which holders are seeking in some cases. At Berlin prices have been firm, and at Cologne there has been a certain advance; Stettin has remained without change. The Netherlands Society of Commerce has fixed for the 26th inst. the half-yearly public sale of tin. The sale will take place at Rotterdam, and will comprise about 65,000 ingots, divided as follows:—26,200 ingots deposited at Rotterdam, 27,500 ingots deposited at Amsterdam, 3900 ingots deposited at Dordrecht, 3200 ingots deposited at Schiedam, and 4200 ingots at Middleburg, plus 400 ingots of Billiton deposited at Rotterdam. The society reserves to itself the right of increasing the quantity indicated for sale by the addition of some 6000 ingots if they arrive in time; it has further declared that it will not bring any other tin on to the market before next spring, and that before then no public sale will be held in the Dutch Indies on Government account. A good current of affairs continues to prevail on the Amsterdam and Rotterdam markets, and the price of the article has been maintained at 54¾ fls. to 55 fls. for Banca, and 53½ fls. to 54 fls. for Billiton; at present purchasers show themselves more reserved, as they are waiting for the result of the approaching public sale. The annexed table shows the deliveries on the Dutch markets during the first eight months of this year, as compared with the corresponding periods of 1866 and 1865:—

	1865.	1866.	1867.
January ..... Ingots	4,230	11,950	10,950
February	4,987	7,959	6,193
March	9,640	17,236	6,519
April	5,650	24,192	12,568
May	5,890	22,739	9,884
June	5,910	10,579	6,600
July	27,297	4,575	9,367
August	32,388	11,525	12,199
Total	93,992	110,755	74,280

The stock on schedules Aug. 31 was 126,306 ingots, as compared with 97,850 ingots Aug. 31, 1866, and 141,619 ingots Aug. 31, 1865. The unsold stock of the Society of Commerce, Aug. 31, was 64,416 ingots, as compared with 136,586 ingots, Aug. 31, 1366, and 42,668 ingots, Aug. 31, 1865. There has been some demand for tin on the Paris market, and the article remains well sustained at 98*l*. per ton for Banca, 94*l*. to 94*l*. 10s. per ton for Straits, and 94*l*. per ton for English. At Hamburg the article has been very firm, in consequence especially of the receipt of advices as to a notable deficit in the production of the island of Banca during the first five months of this year. Under the influence of favourable advices from Holland, the tone of the Cologne and Berlin markets has been satisfactory; at Stettin, Banca has remained in demand. Lead enjoys a certain favour on some German markets. At Hamburg the article being very little offered for sale is sustained easily at previously quoted rates. At Cologne and Stettin prices have been firm, and without variation. The Paris market has been quiet; rough French has made 19*l*. 16s., and Spanish has brought similar terms. At Marseilles the article has been sustained in value in consequence of the little stock now existing on the market. The advices from Germany with regard to zinc are satisfactory; at Breslau the demand has been very active, and some important sales, partly of disposable and partly of lots to be delivered in September, have been concluded. Zinc has maintained a good tone on the Hamburg market, and numerous transactions have been concluded. At Paris the demand has been moderate; rough Silesian is quoted at 21*l*. 16s., and zinc from other sources 21*l*. per ton.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

MELBOURNE, JULY 27.—A new rush on a very extensive scale has just made its way to the Alexandra Diggings, a fresh gold field just opened up on the Goulburn River, where many men are doing well. A new and extensive gold field near Rockhampton, in Queensland, has within the last few weeks attracted many diggers. Some fine copper deposits have also been discovered at Buninyong, near Ballarat. The yields at Ballarat, as well as in other districts, have been exceedingly good, one company, the Hand and Band, obtaining no less than 1500 ozs. of gold in two days. The dividends paid by registered mining companies in this district last week amounted to nearly 13,000*l*., and the average of the last five or six weeks would give an annual revenue from dividends alone of over half a million sterling. The export of gold for the half-year ending July 26 considerably exceeds the export for the corresponding period of last year. The excess for the coming half-year will probably be still greater. To July 26 last year the amount was 986,475 ozs., of which 181,057 ozs. were the produce of New Zealand; and to July 26 this year the amount is 995,144 ozs., of which only 114,282 ozs. are from New Zealand. The difference in favour of 1867, therefore, without regard to New Zealand, is 8669 ozs.

AUSTRALIAN MINES.

YUDANAMUTANA COPPER.—The superintendent (July 27) states: "As no freight for England could be obtained this month, I have sold a further lot of about 30 tons of our rough metal here, realising 2117*l*. 17s. nett, and there is now on the road to port about 40 tons of copper. Contracts for upwards of 7000 tons of wood have been let during the past month, at from 9s. 6d. to 11s. per ton." Capt. Anthony reports under date of July 21.—"Blinman Mine: Twelve men have been employed stoping the back and bottom of the 10 fm. level between the big bunch end No. 4 shaft; two men during a portion of the month at the south end of No. 1 shaft; and three men stoping the "big bunch." The quantity of ore raised is (say) 62 tons, of 16 per cent. as broken. The whole of the above-mentioned places look well, and the yield is quite equal, or rather better, than during the last month. Notwithstanding many hinderances experienced at the smelting-work from the heavy rains, we were enabled to make during the month nearly 40 tons of copper. We have now an abundance of feed and water, and a splended season is secured beyond doubt. Cartage to and from Port Augusta is already reduced to 4*l*. 10s. per ton." The Governor of the colony has ordered a Bill to be laid before the House of Assembly authorising the construction of a line of railway from Port Augusta to a point at least 200 miles northward, on a guarantee of interest by the Government.

WORTHING.—An improvement has taken place in the 73 end since last report, and the lode will yield from 8 to 10 tons of good quality ore to the fathom. No lode has yet been seen in the 73 cross-cut; westward the water is still coming from the breast of the end, and branches of spar and strings of ore have been met with. At present the ground is rather hard. In the 63 end they have been driving in the horse to meet the eastern part of the lode, so as to unwater the 53 fm. level. This end appears to improve, and is beginning to make a little ore; and, as the water is increasing, they have hopes of getting the lode going south regular, and yielding a good quantity of ore. All the stopes are much the same as usual. A branch of ore and spar, from 1 ft. to 1 ft. 3 in. wide, had been discovered in Rogers' cross-cut, going south at the 63, supposed to be a leader to the lode; it is only visible under the slide branch, and seems regular and well defined; water still coming out of the slide to the eastward. The machinery is in good working order, and firewood is coming in plentifully. Number of hands employed, 129; ore raised and dressed 170 tons; regulus made, 40 tons; regulus on hand, 23 tons; and 21 tons delivered, but not drawn for. The committee of management have forwarded 100*l*. by this mail.

GREAT NORTHERN COPPER.—July 20: Capt. Tonkin reports:—Nuccaleena Mine: The lode in the end, south of long cross-cut, is small at present, and has been much disordered of late through meeting with a small cross-course, which has caused the change. The strata of the country we are driving in are as favourable as ever. I am of opinion that the main part of the lode is still further south, and would recommend driving from our present end due south, in order to intersect the lode.

ENGLISH AND AUSTRALIAN COPPER.—The quantity of coal at Kooringa (July 29) was 1035 tons; at Kapunda, 302 tons; and at Port Adelaide, 1050 tons. There were three furnaces at work at Kooringa. At the Port Works all the fires were out, for stock-taking and the usual thorough cleaning up, also for repairs to culverts, &c. Since the date of the last advices about 75 tons of copper had been shipped.

SCOTTISH AUSTRALIAN.—The directors have advices from the superintendent at Sydney, dated July 23, with reports from Lambton Colliery to same date. The sales of coal for June amounted to 12,834 tons, making a total for the half-year of 85,150 tons. Mr. Young, the assistant superintendent, remarks:—"Lambton Colliery: Everything connected with this undertaking goes on in a fairly satisfactory manner. The shipments of coal for the last month, it will be seen, amounted to 12,834 tons, which, though a falling off from the previous one, may be considered a good month's work."

CADIANGULLONG COPPER.—The directors have advices from Sydney, dated July 24, with reports from the copper mine and smelting works to the 19th.—Copper Mine: During the month there were sampled from the mine 88 tons of ore, averaging 13⅜ per cent. for copper, and yielding by assay 11¾ tons of fine copper.—Smelting Works: There were in store at Sydney 2¾ tons of fine copper, on the road thither 1¾ ton, at the works 12¾ tons completed, and 13 tons in a state of forwardness: ore on hand 51 tons, wood 936 tons. The bad state of the roads, in consequence of recent floods, had prevented Capt. Holman from sending more copper from the works to Sydney. The limited explorations of the auriferous veinstone had been much impeded by the wet weather which had prevailed during the greater part of the month. Patches of gold-bearing quartz continued to be discovered, but a well-defined reef had not been proved to exist.

FORTUNE COPPER.—July 9: Capt. Penberthy reports:—No material change to notice since my last. The machinery, pitwork, &c., are working well and satisfactorily. We dressed during June 85 tons of lead ore, from 75 to 80 per cent., and 5 tons of copper ore; also forwarded to port 73 tons of lead ore. Shipped, per Anglo-Indian, 110 tons of lead ore, and 140 tons per Strathmore. In store awaiting shipment, 253 tons lead ore, 47 tons copper ore.

PORT PHILLIP AND COLONIAL GOLD.—Mr. Bland, Clunes, July 25: Quartz Crushing: The quantity of quartz crushed during the month of June was 4654 tons, yielding 2839 ozs. 13 dwts. of gold, or an average of 12 dwts. 5 grs. per ton. The above return is a very satisfactory one, notwithstanding a reduction in the yield of 1 dwt. 6 grs. per ton, as compared with the May return. The yield is still keeping up; the best quartz seems to be coming from two stopes on Robinson's reef above the 374 ft. level. We are getting good stone, however, from portions of all the reefs. The receipts for June were 10,689*l*. 6s. 3d., expenditure 4850*l*. 0s. 4d., profit 5839*l*. 5s. 11d., added to which is the balance of last month, 106*l*. 16s. 7d., which shows an available balance of 5946*l*. 2s. 6d. The amount divided between the two companies was 5000*l*., of which the Port Phillip Company's proportion is 3250*l*. In addition to the amount divided, Mr. Bland paid 900*l*. on water supply account.—Mine: All the work in and about the mine is going on very well. The sinking the north shaft has not proceeded at such a rapid rate the last few weeks as it did a short time before, owing to the ground having got harder, with quartz veins in it; these have now mostly disappeared, and sinking is again easier; the depth at the present time is 66 feet below the No. 6 plat, and just to where the cap-piece of the No. 7 plat will come. Total depth from surface 583 feet.—Machinery: The stamps are in good order, and doing a satisfactory amount of duty. The engines and boilers are also working well, and the latter not giving us any trouble now that we are using soft clear water. The tailings pumps are not now at work, the late floods having cleared out the creek sufficiently to allow the tail-sand to run without requiring to be lifted.—Return for Month of July: Quantity of quartz crushed for four weeks was 4657 tons; yield of gold for three weeks, 2410 ozs. 15 dwts., or an average of 14 dwts. 4 grs. per ton.—Remittance, 3000*l*.

FOREIGN MINES.

WEST CANADA.—Capt. Plummer, Aug. 19: Copper Bay Mine: The lode in the 40, east of the new engine-shaft, continues poor, and is not very promising. The lode in the 30 east yields 1½ ton per fm. The stope west of shaft 2 tons, and the stopes east and west of Stephens's winze each 2 tons. The 50 fm. level, west of Palmer's, yields about 5 tons per fm., and the stope east of shaft, in the bottom of the 35, 3 tons. The stope in the bottom of the 20, west of shaft, 3 tons, and in the east 4 tons.—Bray's Shaft: The lode looks favourable, and shows signs of further improvement. The usual progress is being made in sinking. We are progressing favourably in the cross-cut putting out in the 35, to intersect the "fire" lode. The lode in the stope west of Carmichael's winze yields 2 tons, and in the stope east of ditto 2½ tons per fm.—Wellington: The lode in the bottom of Crase's shaft is not improved. The lode in the winze west of shaft yields 2 tons per fm. The stope east of Mitchell's yields 2 tons per fm. The lode in the 20, east of shaft, yields 1½ ton, and the stope below this about the same. The stope east of Hooper's yields 2 tons, and that west of Rowe's 2 tons of ore per fm.—Bruce Mine: The 15, east of trial shaft, is not so good; the lode seems to be slightly disordered by joints crossing obliquely through it; it yields 1¼ ton per fm. The stope in the back is slightly improved; it yields 2 tons, and the stope in the bottom is of similar quantity. The lode at Taylor's is large and well defined, and we think of late it has a little improved; but it does not yield so well as we all expected it would do; the lode is 9 ft. wide, enclosed with wall rock of such a character as is generally where the best of copper prevails; the reason of its barreness cannot be explained. A steamer will be dispatched to-morrow with a cargo of 500 tons (American).

PONTGIBAUD.—W. H. Rickard, Sept. 2: Roure: The 125 metre level south of Richards's shaft, is in a soft, speedy lode, showing spots of ore. The rise in the same level south is in speedy ground. We have set to sink towards it from the 100, and hope to hole this month. The 80 metre level south yields stones of quartz, but no lead ore. The 60 metre level continues to open stoping ground, worth 1¾ ton per fathom. The 40 metre level south is still unproductive. In the adit, south of Richards's shaft, the lode opens a little tribute ground. The stollen south is speedy for driving, but the lode has become small within the last 10 metres driving. The stollen cross-cuts west are without change. Our stopes, which are as follows, one in the back of the 100, two in the back of the 80, two in the back of the 60, two in the 40, two in the 20, and one in the back of the adit, yields a pretty fair quantity of stuff, but of coarser quality than during former months. Our tribute pitches continue to yield about the same quantity of ore as for several months past.—La Grange: We have cut into the lode 4 ft. in the 80, at Nosky's shaft, where it produces saving work of low quality, but we are not yet in the most productive part of the lode. The 60 cross-cut has gone through 8 metres of lodey stuff, which will pay for stoping. The winze sinking below this level yields ¾ ton of ore per fathom.—Mioche: The lode in the adit level, south of railway, is poor. The sinking of the surface shaft has gone on well, and is deep enough for the adit, which is being cleared and repaired to make a communication with it.—La Brousse: Basset's engine-shaft will be deep enough for the 80 metre level by the end of this month. The 60 metre level south yields 1 ton of ore per fathom. The 40 metre level, on the eastern part of the lode, yields 2½ tons per fathom. The adit north continues without change. Our tribute pitches continue to yield well.—Pranal: The cross-cut east, in the 50 metre level, is a little stiffer. The rise over this cross-cut west is holed to the 30, which will give us good ventilation. The 50 metre level north, on St. Matthews's lode, yields 2 tons of ore per fathom; the 30 north, ¾ ton per fathom; the 8 south is poor; the 8 north yields ½ ton per fathom. Our samplings have amounted to 294¾ tons.

FORTUNA.—Aug. 31: Canada Incosa—West of Taylor's Engine-shaft: The ground in the 100, west of O'Shea's shaft, is without change. The lode in the 90, west of Judd's shaft, is compact and regular, producing 2 tons of ore per fm.; the ground is easy for driving. In the 80, west of Judd's shaft, there is a good lode in the bottom of the level, producing ¾ ton of ore per fm., but in the back it is small, east of engine-shaft. The lode in the 70, west of Kennedy's shaft, contains stones of lead ore. In the 70, east of Carro's shaft, the lode is rather small, composed of carbonate of lime, and producing 1 ton of ore per fm. The 55, east of Carro's, is hard for driving, and the lode is small. The 55, west of Santo Tomas, produces ½ ton of ore per fm.; the lode is divided into two small branches.—Shafts and Winzes: Moral's winze, below the 55, has entered the cross-course, which has cut off the lode. Rubio's winze, below the 45, will probably be communicated with the 55 this month.—South Lode: The lode in the 40, west of San Pedro shaft, is large, composed of quartz, and producing ¾ ton of lead ore per fm. In the 30, west of San Pedro shaft, the lode is large and regular, composed of quartz and peroxide of iron, and producing about ½ ton of lead ore per fm. The character of the lode in the 40, east of San Pedro shaft, is not so good as we could wish, and the ground is hard for driving; the lode, however, produces ½ ton of ore per fm. In San Pedro shaft, considering the nature of the ground, the men are making good progress. Gil's winze, below the 40, produces ¾ ton of ore per fm.; the lode has a kindly appearance, and the ground is easy for sinking.—Los Salidos Mine: In the 100, west of engine-shaft, the elvan is very hard, and the progress is, consequently, slow. The 90, west of engine-shaft, produces 1 ton of ore per fm.; the lode is now disordered, being split up into several small branches. In the 75, west of Buenos Amigos, the lode has a very fine appearance, producing 2½ tons of ore per fm. The 65, west of San Carlos, produces ½ ton of ore per fm.; the lode is small, and the ground hard. The 100, east of engine-shaft, produces good stones of lead ore. In the 90, east of Cox's, the lode is still small and valueless. The lode in the 75, east of Cox's shaft, is regular and kindly, though not quite so good as it has been; it produces 1 ton of ore per fm. The lode in the 65, east of San Pablos, is compact and solid, producing 1¼ ton of ore per fm.—Shafts and Winzes: We hope to communicate San Miguel shaft below the 55 with the 65 in a few days. We have commenced sinking San Pablos shaft that we may get it down by the time the 75 reaches it; the lode produces 1 ton of ore per fm. In Marin's winze, below the 75, there is still a good lode in the western end, but the bottom is poor. Reguena's winze, below the 90, produces 1¾ ton of ore per fm. We expect to hole to the 100 shortly. We have abandoned Hernandes' winze, in the bottom of the 65, owing to a great increase of water; the lode produces 1¾ ton of ore per fm.

LINARES.—Aug. 31: West of Engine-shaft—South Lode: The lode in the 110, west of engine-shaft, contains good stones of lead in the south part, worth ½ ton per fathom.—East of Engine-shaft: The 95, east of Taylor's cross-cut, produces ½ ton of ore per fathom; the lode is large, and in the bottom of the end good. The 95, west of Taylor's shaft, is very hard. The cross-cut north in the 95 has intersected the lode, which is very large, consisting chiefly of calcareous spar.—Winzes: No. 154 winze below the 85 contains spots of lead, but not sufficient to attach a value to. The stopes during the past month have yielded a fair quantity of mineral, and are looking much as usual. Having set the Quincintos engine to work the engineers will now pay very close attention to the machinery on the mine with a view of economising fuel. We estimate the raisings for September at 275 tons.

ALAMILLOS.—Aug. 31: The lode in the 3d level, east of Magdalena shaft, is small and poor, and the ground is very hard. The 3d level, east of San Enrique, has for a good length proved moderately productive, and has opened up a great deal of tribute ground; the lode now produces 1 ton of ore per fathom. In the 4th level, east of Magdalena, the lode continues very rich in the bottom of the end, producing 4 tons of ore per fathom. The 4th level, west of Magdalena shaft, is also opening up a valuable piece of ore ground; the lode here yields 3 tons of ore per fathom. The lode in the 4th level, east of Taylor's engine-shaft, is disarranged and irregular. In the 4th level, west of Taylor's engine-shaft, the lode is large and strong, and spotted with lead. The lode in the 4th level, east of San Andriano shaft, is open and vughy, and contains good stones of ore. The 4th level, west of San Andriano shaft, is hard, and the lode small. The 3d level, west of San Andriano shaft, has opened a great length of fairly productive ground in the past month. The driving of the 3d level, west of Crosby's engine-shaft, is suspended, and the men are put to cross-cut south to the middle lode. The lode in the 2d level, west of Crosby's cross-cut, is unproductive.—Shafts and Winzes: In Taylor's engine-shaft, below the 4th level, the men are getting on very regularly. In Riva's winze, below the 3d level, the lode is small, and the ground hard. The tribute department has not undergone any change worthy of notice during the past month, and continues to yield a fair average quantity of mineral. The surface works are going on very regularly. We estimate the raisings for September at 200 tons.

TITANIFEROUS SAND.—A curious paper has been received by the Academy of Sciences on a sort of sand which is very common in the Portuguese island of Santiago, in the Cape Verd archipelago. This sand is composed of extremely small grains, jet-black, but not crystalline, accidentally mixed up with a very few coloured particles. It is attracted by the magnet, but all of its grains do not possess this property; and to separate those that do, M. Silva has employed the very process of attraction above alluded to, whereby he has obtained 82 gms. of magnetic matter out of 162 gms. of sand, being a proportion of 55 per cent. The magnetic grains are all black, with a metallic lustre; they are very hard, but may still be ground to powder. Their density is 4·762. The powder soils the fingers, having lost none of its original blackness. Concentrated hydrochloric acid will attack it at a high temperature, especially in a phial provided with a long tube; nevertheless a few coloured particles remain untouched and a white precipitate is formed, which, however, disappears when a little zinc is thrown in, and the solution then assumes a violet colour. By analysis it is found to contain 21 per cent. of titanic acid, 52 of metallic iron, 2 of magnesia, 2 of alumina and traces of manganese and emery, the latter constituting the residue. The unmagnetic portion of the sand is composed of dull black grains, which are not so hard as the others, and can be much more easily reduced to powder, which then is reddish and does not soil the fingers. Its density is 3·434, it does not melt under the action of the blow-pipe, and is but partially soluble in hydrochloric acid at a high temperature. It contains silicic and titanic acids, iron, lime, alumina, magnesia, manganese, and emery. This sand might become very valuable from the iron and titanic acid it contains.—*Galignani.*

THE AMERICAN TUBE WELL.—An improved and extremely economic well is at present being introduced by Mr. Norton, of Blackfriars-street, Manchester, which consists of an iron pipe pointed at one end and perforated for some short distance up the side. A movable iron clamp is fitted round the pipe, and, upon the principle of pile-driving, a 56 lb. hollow weight is raised and allowed to drop upon the clamp; thus the pipe is driven into the ground. Earth, sand, &c., first enter the pipe through the holes, and when these are pumped out the theory is that pebbles rest against the pipe and form a natural filter. Such a well is free from the liability common to others of receiving surface drainage, and the water obtained from it is always cold and fresh. No dirt is made in sinking the well, no accident is possible from foul air, or from the falling in of the sides; and besides the rapidity with which the well is made, its cheapness, about 5*l*. for the completion of a well 15 ft. deep, is another great recommendation. There can be no doubt that the invention will be extensively adopted as soon as its merits become known.

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London: Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors), at their offices, 26, FLEET STREET, E.C., where all communications are requested to be addressed. [*Sept.* 14, 1867.